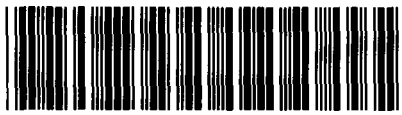

Control Number: 39339

Item Number: 128

Addendum StartPage: 0

**PROJECT NO. 39339**

| | | |
|---|---|---|
| **REPORT FOR ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING PURSUANT TO 16 TEX. ADMIN. CODE § 25.95** | § § § § | **PUBLIC UTILITY COMMISSION OF TEXAS** |

# STORM HARDENING PLAN SUMMARY OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC PURSUANT TO 16 TEX. ADMIN. CODE § 25.95

Contact: Rebecca Zerwas
Telephone: 512-397-3047
Rebecca.Zerwas@CenterPointEnergy.com

## Table of Contents





128

**PROJECT NO. 39339**

| | | |
|---|---|---|
| **REPORT FOR ELECTRIC UTILITY INFRASTRUCTURE STORM HARDENING PURSUANT TO 16 TEX. ADMIN. CODE § 25.95** | **§ § § §** | **PUBLIC UTILITY COMMISSION OF TEXAS** |

## STORM HARDENING PLAN SUMMARY OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC PURSUANT TO 16 TEX. ADMIN. CODE § 25.95

On April 29, 2011, CenterPoint Energy Houston Electric, LLC ("CenterPoint Energy" or "the Company") submitted a summary describing the Company's storm hardening plan over a five-year period beginning January 1, 2011. Pursuant to 16 Tex. Admin. Code § 25.95, CenterPoint Energy submits the following summary of material revisions to the storm hardening plan and a detailed summary of the Company's progress in implementing the plan.

Respectfully submitted,

Rebecca Zerwas
Manager Regulatory Affairs
CenterPoint Energy Service Company LLC
1005 Congress Avenue, Suite 650
Austin, Texas 78701
(512) 397-3047
(512) 949-3050 (fax)
Rebecca.Zerwas@CenterPointEnergy.com

ATTACHMENT A

Storm Hardening Plan Summary

Submitted May 1, 2019

## STORM HARDENING PLAN SUMMARY
## OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC

### I. 16 Tex. Admin. Code § 25.95(e)(1)

*Construction standards, policies, procedures, and practices employed to enhance the reliability of utility systems, including overhead and underground transmission and distribution facilities*

There were no material revisions to the transmission and substation construction standards, policies, procedures, and practices employed to enhance the reliability of CenterPoint Energy's systems. Minor revisions include the following:

1. Beginning in 2012, new overhead distribution services were limited to transformer banks consisting of three transformers no larger than 167 kVA each. This decreases the exposure of large overhead transformer banks and thus should reduce the number of transformer replacements during a major storm event.
2. All new overhead distribution freeway crossings are built on concrete poles.
3. Beginning in 2017, for transmission facility designs, CenterPoint Energy used the design requirements in the latest National Electrical Safety Code ("NESC") C2 2017 edition, which replaced the NESC C2 2012 edition.
4. Substation equipment maintenance is performed during planned intervals in accordance with North American Electric Reliability Corporation ("NERC") requirements and based on criteria that may include manufacturer's recommendations, equipment history, and operational experience.
5. As part of the Company's Intelligent Grid project, on-line monitoring equipment was installed on selected power transformers to observe transformer conditions. The Company is not proactively installing transformer monitoring devices at non-Intelligent Grid locations, but all new transformers being purchased have a pre-installed monitoring device. The on-line monitoring information will assist in analyzing various temperature readings and in monitoring the cooling fans for the transformer. Microprocessor-based relay systems are also being installed on distribution feeders. These relays will provide timely information on substation circuit breaker health, feeder fault information, and overall performance.

6. Beginning in 2014, the Company began installing additional guy strains in down guy installations on wood poles that carry energized distribution equipment.

7. Beginning in 2013, the Company began a proactive Underground Residential Distribution ("URD") Cable Life Extension Program ("CLEP") to assess URD spans and determine effective life.

There were no other material revisions to the distribution construction standards, policies, procedures, and practices employed to enhance the reliability of CenterPoint Energy's systems.

## II. 16 Tex. Admin. Code § 25.95(e)(2)

*Vegetation Management Plan for distribution facilities, including a tree pruning methodology and pruning cycle, hazard tree identification and mitigation plans, and customer education and notification practices related to vegetation management*

16 Tex. Admin. Code § 25.96(c) ("TAC") states that compliance with that section "fully satisfies the vegetation management planning and reporting requirements" of 16 TAC § 25.95(e)(2); therefore, this report does not contain information related to vegetation management.

## III. 16 Tex. Admin. Code § 25.95(e)(3)

*Plans and procedures to consider infrastructure improvements for its distribution system based on smart grid concepts that provide enhanced outage resilience, faster outage restoration, and/or grid self-healing*

There were minor revisions to the Company's plans and procedures to consider infrastructure improvements for its distribution system based on smart grid concepts that provide enhanced outage resilience, faster outage restoration, and grid self-healing. These changes include the installation of Intelligent Grid automation equipment and technology. Electromechanical distribution circuit relays were replaced with microprocessor-based relays at the 31 designated Intelligent Grid substations. Electromechanical relays are being replaced at other substations on an as-needed basis as they approach their end of life. Microprocessor-based relays are being installed on new distribution feeders. These relays will provide timely information on substation circuit breaker health, feeder fault information, and overall performance.

In March 2015, the Company installed an Advanced Distribution Management System for situational awareness and management of its distribution system infrastructure in real-time. The project leverages the management and control of CenterPoint Energy's Advanced Metering System ("AMS") project to support the installation of intelligent grid automation equipment and technology. Together, the AMS and intelligent grid equipment and technology should allow more efficient grid operation, increase grid reliability, and enable grid automated recovery and restoration. The Intelligent Grid is anticipated to limit the effects of power outages by detecting faulted circuits and automatically rerouting power to customers. The Intelligent Grid is expected to reduce the length of power outages.

In 2018, CenterPoint Energy installed 83 intelligent grid switching devices as part of normal distribution capacity, reliability, or line protection requirements. CenterPoint Energy continues to expand the intelligent grid in areas that achieve the greatest reliability impact.

CenterPoint Energy completed the installation of advanced meters on all of the Company's 2.2 million customer meters on July 1, 2012. In addition to the enhanced electric market operation, the advanced meters are capable of reporting power outages at customer premises instantaneously. CenterPoint Energy is using data analytics as a tool to process and filter meter data into operational metrics.

## IV. 16 Tex. Admin. Code § 25.95(e)(4)

*Plans and procedures to enhance post storm damage assessment, including enhanced data collection methods for damaged poles and fallen trees*

CenterPoint Energy's plans regarding distribution post storm damage assessment includes a commitment to complete a detailed and thorough inspection of all system damage after a major storm. Such an assessment will provide additional information that has not been provided by a simple list of facilities that need to be repaired. Damage assessment data is the main factor that finalizes resource levels and is central information for planning and assigning work, determining additional material needs, determining and reporting estimated restoration dates, and documenting facility replacements for mapping records. CenterPoint Energy has established contracts with multiple damage assessment contractors to ensure a timely, complete, and thorough assessment of system damage after a major storm.

There were no other material revisions to the Company's plans and procedures to enhance post storm damage assessment, including enhanced data collection methods for damaged poles and fallen trees.

## V. 16 Tex. Admin. Code § 25.95(e)(5)

*Transmission and distribution pole construction standards, pole attachment policies, and pole testing schedule*

There were no material revisions to the Company's transmission and distribution pole construction standards and pole attachment policies or the transmission pole testing schedule. There were minor revisions to the Company's pole attachment policies. The Company uses its website (http://www.centerpointenergy.com/services/andmore/poleattachments) to provide any prospective attaching entity detailed information regarding CenterPoint Energy's pole attachment practices. This information is in manual form and can be downloaded from the website. Upon installation and from time to time thereafter, CenterPoint Energy may require any non-compliant attachment to be removed and re-attached properly at the sole cost and expense of the attaching entity.

CenterPoint Energy's proactive distribution Pole Maintenance Program provides that a portion of the distribution system poles be assessed annually by contract ground-line crews. Pole assessments include a visual and/or manual assessment. Visual pole assessments are comprised of a field observation for evidence of exterior decay or damage above the ground line. Poles that are seven years old or older are manually excavated and assessed for decay below the ground line, as well as sounded and bored to locate internal voids. Poles of sufficient strength to remain in service until the next scheduled assessment are treated and tagged. Poles that are identified for reinforcement during these assessments are either treated (with a fumigant or preservative, as necessary) and braced, or replaced.

The Pole Maintenance Program also includes visual assessment of guy wires, including checking for guy wires that are damaged, broken, frayed or slack, and assessment of guy strains and anchors.

As part of the grid hardening initiative, pole assessments and treatment have been accelerated, so approximately 10% of the Company's poles are assessed annually, on average, on a rolling ten-year cycle. As such, pole bracings and replacements will increase accordingly.

Additional foreign poles containing Company facilities that may merit replacement by third parties are also identified.

## VI. 16 Tex. Admin. Code § 25.95(e)(6)

*Distribution feeder inspection schedule*

In addition to the pole maintenance program discussed above, CenterPoint Energy utilizes four other programs that incorporate ground-based inspection programs of overhead distribution facilities. These programs are the Infra-Red Program, the Root Cause Analysis Program for the 10% Circuits, the Hot Fuse Program, and the Feeder Inspection Program. The only programs discussed below are those with material revisions.

(a) The Infra-Red Program

Infra-red technology allows the Company to see the heat generated by deteriorating components on the distribution system. These "Hot Spots" will eventually result in equipment failure and a loss of service. Infra-red technology provides a unique tool to find potential equipment outages before they occur, so that proactive repairs can be made prior to an outage. This program reduces the number of equipment failures and improves reliability by decreasing System Average Interruption Duration Index ("SAIDI") and System Average Interruption Frequency Index ("SAIFI").

All circuits are inspected on an eight-year cycle. 77 benchmark circuits that are representative of the overall CNP system are inspected every two years to insure that the eight-year cycle is adequate to achieve the desired reliability results. If a circuit is identified as a repeating 4+yr 10% or 300% circuit, then it is advanced on the infra-red inspection schedule to the current year. This additional focus on the circuits with the highest SAIDI and SAIFI minutes is done to address any performance issues. Also, circuits that are heavily loaded (greater than 500 amps) are inspected, as data has proven a higher failure rate of equipment when subjected to higher load.

Infra-red scans are made of the terminal poles at the substation and major equipment on the circuit, including pole-top switches, reclosers, regulators, and capacitors. Scans are also performed on the fuse cutouts, jumpers, splices, and transformers along the circuit backbone. The identified hot spots are reported, and repairs are made. If the problem is severe enough and there

is a danger of imminent failure, then procedures are taken to isolate the device and initiate immediate repairs.

(b) The Root Cause Analysis Program for the 10% Circuits

The program is designed so that the action plan and recommended construction be completed within 120 days.

(c) Feeder Inspection Program

CenterPoint Energy has instituted a proactive feeder inspection program. Through this program, distribution feeders are inspected on a periodic basis to identify and correct issues found with the condition of the feeder that could impact the reliable operation of the feeder. This periodic inspection and maintenance is expected to improve the performance of the feeders under adverse weather conditions. Damaged or broken facilities are identified, reports are made, and work orders to repair are issued accordingly.

(d) "As You Go" Inspections

As many as 700 personnel are in the field on a daily basis. This includes linemen, crew leaders, service consultants, and engineers. As they go about their daily business, they observe the condition of overhead facilities and report any unusual problems. Cameras have been made available to these personnel and they have been instructed to visually record these abnormal conditions. Work orders are then created from these pictures so that crews can be routed to correct the issue.

## VII. 16 Tex. Admin. Code § 25.95(e)(7)

*Plans and procedures to enhance the reliability of overhead and underground transmission and distribution facilities through the use of transmission and distribution automation*

There were no material revisions to the Company's plans and procedures to enhance the reliability of the overhead and underground transmission or substation facilities through automation.

In 2011, CenterPoint Energy instituted a procedure to no longer install automation on line reclosers and pole-top switches. Instead, the Company utilizes the devices in the intelligent grid deployment. These devices are state of the art equipment that allows for the functionality of the existing equipment coupled with enhanced features. The Company is able to program these devices to automatically sectionalize for a fault and then reclose if the fault has had one of the following occur: cleared, auto-sectionalize without a reclose, a remote command to operate, or a local command in the same device. Because one device can be programmed or re-programmed to perform the functionality of several devices, the device can be quickly modified in a distribution system that is changing. The devices are designed to interface with state of the art communication protocols, so that there is an interface with the new distribution communication network.

CenterPoint Energy maintains a hardened transmission primary control center with redundant computer systems separated by firewalls. The transmission control center provides the ability to monitor and remotely operate the Company's transmission network from a secure, storm-hardened facility, including the ability to dynamically rate transmission circuits and restore service to customers impacted by a storm through remote control of switching equipment.

CenterPoint Energy completed construction of a back-up transmission control center in December 2015, in compliance with NERC Reliability Standard EOP-008. The back-up control center is a storm hardened facility with redundant computer systems and can perform the same functions provided by the primary control center in the event the functionality of the existing transmission control center is impaired or lost. In January 2016, the backup control center received certification from NERC/Texas Reliability Entity ("TRE") that the new facility met all requirements to operate the CenterPoint Energy transmission system independent of the primary control center.

## VIII. 16 Tex. Admin. Code § 25.95(e)(8)

*Plans and procedures to comply with the most recent National Electric Safety Code (NESC) wind loading standards in hurricane prone areas for new construction and rebuilds of the transmission and distribution system*

There were no material revisions to the Company's plans and procedures to comply with the most recent NESC wind load standards in hurricane prone areas for new construction and

rebuilds of the transmission and distribution system. CenterPoint Energy adopted the latest NESC C2-2017 design requirements into its design criteria for overhead lines.

## IX. 16 Tex. Admin. Code § 25.95(e)(9)

*Plans and procedures to review new construction and rebuilds to the distribution system to determine whether they should be built to NESC Grade B (or equivalent) standards*

All new overhead distribution freeway crossings are built on concrete poles. There were no other material revisions to the Company's plans and procedures to review new construction and rebuilds to the distribution system to determine whether they should be built to NESC Grade B or equivalent standards.

## X. 16 Tex. Admin. Code § 25.95(e)(10)

*Plans and procedures to develop a damage/outage prediction model for the transmission and distribution system*

There were no material revisions to the Company's plans and procedures to develop a damage or outage prediction model for the transmission and distribution system.

## XI. 16 Tex. Admin. Code § 25.95(e)(11)

*Plans and procedures for use of structures owned by other entities in the provision of distribution service, such as poles owned by telecommunications utilities*

There were no material revisions to the Company's plans and procedures for use of structures owned by other entities in the provision of distribution service, such as poles owned by telecommunications utilities.

## XII. 16 Tex. Admin. Code § 25.95(e)(12)

*Plans and procedures for restoration of service to priority loads and for consideration of targeted storm hardening of infrastructure used to serve priority loads*

There were no material revisions to the Company's plans and procedures for restoration of service to priority loads and for consideration of targeted storm hardening of infrastructure used to serve priority loads.

## XIII. Other Storm Hardening Plans

CenterPoint Energy has the following revised and additional plans to harden its transmission and substation facilities during the next five years.

| Project Name | Location (City/ County) | Description | Estimated (or Actual) Start Date | Estimated Completion Date | Estimated Project Cost |
|---|---|---|---|---|---|
| West Galveston-Galveston 26th #926 | Galveston/ Galveston | Rebuild portion of 138 kV Ckt 63A to meet the most recent NESC C2-2017 extreme wind loading requirements. | 10/03/2018 | 5/30/2019 | $6,309,000 |
| AMOCO - Algoa Corner #963 | League City, Alvin, Galveston, Brazoria | Rebuild portion of 138 kV Ckt 04A to meet the most recent NESC C2-2017 extreme wind loading requirements. | 01/18/2016 | 4/30/2019 | $29,612,000 |
| MONSAN-AMOCO #963.1 | Brazoria | Rebuild portion of 138 kV Ckt 04B to meet the most recent NESC C2-2017 extreme wind loading requirements. | 04/03/2018 | 04/30/2019 | $4,285,000 |
| Cedar Bayou-Chambers-King-North Belt-T.H. Wharton (Modifications) #881 | Baytown, Mont Belvieu, Houston, Chambers, Harris | Modification of 345 kV Ckts. 97A, 97B, 97C, 97E, and 99G to meet the most recent NESC C2-2017 extreme wind loading requirements. | 11/15/2017 | 05/31/2019 | $5,266,000 |
| Morgans Point-Sandy Point #857.2 | LaPorte, Harris | Rebuild portion of 138 kV Ckt 96D & 96F to meet the most recent NESC C2-2017 extreme wind loading requirements. | 09/15/2019 | 06/30/2020 | $4,502,000 |
| Angleton – Liverpool #1037 | Angleton, Brazoria | Rebuild portion of 138kV Ckt 04C to meet the most recent NESC C2-2017 extreme wind loading requirements. | 6/1/2019 | 5/1/2020 | $29,000,000 |
| Highlands Tap #1150 | Baytown, Harris | Rebuild portion of 138kV Ckt 08G to meet the most recent NESC C2-2017 extreme wing loading requirements. | 1/2/2019 | 11/30/2019 | $8,242,000 |

| | | | | | |
|---|---|---|---|---|---|
| Moody – Stewart | Galveston, Galveston | Rebuild portion of 138kV Ckt 63C to meet the most recent NESC C2-2017 extreme wind loading requirements. | 09/01/2019 | 12/01/2020 | $6,600,000 |
| Rittenhouse Tap #924 | Houston, Harris | Rebuild portion of 138kV Ckt 86E to meet the most recent NESC C2-2017 extreme wind loading requirements. | 01/01/2019 | 05/31/2020 | $2,100,000 |
| West Columbia-Lake Jackson Airflow Spoilers #22-3 | Lake Jackson, Brazoria | Retrofit portion of 138 kV Ckt 02C with anti-galloping devices to avoid damage from icing conditions. | 11/1/2018 | 5/1/2019 | $748,000 |
| CROSBY-CONNER Airflow Spoilers #22-4 | Houston, Harris, Liberty, Chambers | Retrofit portion of 138 kV Ckt 86D with anti-galloping devices to avoid damage from icing conditions. | 4/20/2019 | 12/31/19 | $450,000 |
| BRITMOORE-CLODINE Airflow Spoilers #22-5 | Houston, Harris | Retrofit portion of 138 kV Ckt 73B with anti-galloping devices to avoid damage from icing conditions. | 4/8/2019 | 5/31/2020 | $450,000 |
| IMPERIAL-WA PARISH Airflow Spoilers #22-6 | Houston, Harris, Fort Bend | Retrofit portion of 138 kV Ckt 80B with anti-galloping devices to avoid damage from icing conditions. | 4/20/2019 | 5/31/2020 | $450,000 |
| EAST BERNARD-DYANN Airflow Spoilers #22-7 | Houston, Wharton | Retrofit portion of 138 kV Ckt 60B with anti-galloping devices to avoid damage from icing conditions. | 4/20/2019 | 12/31/2020 | $450,000 |
| NORTH BELT-TH WHARTON Airflow Spoilers #22-8 | Houston, Harris | Retrofit portion of Ckt 95A with anti-galloping devices to avoid damage from icing conditions. | 5/20/2019 | 12/31/2020 | $450,000 |
| LA MARQUE-WEST GALVESTION Airflow Spoilers #22-9 | Galveston/ Galveston | Retrofit portion of 138 kV Ckt 93C with anti-galloping devices to avoid damage from icing conditions. | 5/20/2019 | 5/31/2021 | $450,000 |
| HOCKLEY-PETERS Airflow Spoilers #22-10 | Houston, Waller, Austin | Retrofit portion of 138 kV Ckt 65B with anti-galloping devices to avoid damage from icing conditions. | 5/20/2019 | 5/31/2021 | $450,000 |
| ZENITH-ADDICKS Airflow Spoilers | Houston, Harris | Retrofit portion of 138kV Ckt 76A with anti-galloping devices to avoid damage | 5/20/2019 | 12/31/2021 | $450,000 |

| | | | | | |
|---|---|---|---|---|---|
| #22-11 | | from icing conditions | | | |
| FLEWELLEN-BRAZOS VALLEY Airflow Spoilers #22-12 | Houston, Fort Bend | Retrofit portion of 138 kV Ckt 09G with anti-galloping devices to avoid damage from icing conditions. | 5/20/2019 | 12/31/2021 | $450,000 |
| Wallisville Substation | Harris | Build elevated control cubicle to avoid damage from flooding. | 08/03/2018 | 9/30/2019 | $900,000 |
| Wharton Substation | Wharton | Build elevated control cubicle to avoid damage from flooding. | 07/26/2018 | 08/19/2019 | $1,400,000 |
| West Columbia Substation | Brazoria | Build elevated control cubicle and elevate breakers and pull boxes to avoid damage from flooding. | 01/21/2019 | 5/15/2020 | $1,600,000 |

## XIV. Detailed Summary of the Company's Progress in Implementing the Plan

| Section | Progress During 2017 |
|---|---|
| I. Construction standards, policies, procedures, and practices | • All distribution, substation, and transmission construction standards, planning design criteria, facility design criteria, system protection practices, and maintenance practices were followed. |
| II. Vegetation management | • Vegetation management will be reported pursuant to 16 TAC § 25.96. |
| III. Smart Grid | • 83 intelligent grid switching devices were installed in 2018.<br>• DSCADA has the capability to remotely control approximately 1,525 distribution switching devices (557 legacy devices and 968 IGSD devices). |
| IV. Post storm damage assessment of distribution and transmission systems | • Contracts were established with multiple damage assessment contractors to identify distribution damage after a major storm.<br>• Procedures for transmission damage assessment were established. |

| | |
|---|---|
| V. Transmission and distribution pole construction standards, pole attachment policies, and pole testing schedule | • All pole construction standards were followed.<br>• All Federal Communications Commission and Company attachment policies were followed.<br>• 148,461 CenterPoint Energy distribution poles were assessed. |
| VI. Distribution feeder inspections | • 54 distribution circuits were inspected resulting in 254 work orders issued.<br>• 339 distribution circuits had infrared inspections.<br>• As part of the Root Cause Analysis Program, circuit inspections were performed on the 10% and 300% circuits.<br>• As part of the Hot Fuse Program, inspections were made of laterals that had recurring outages. |
| VII. Transmission, Substation, Distribution and Control Center automation | • Automation was a standard part of transmission, substation and control center operations.<br>• See Section III. Smart Grid above for distribution automation progress.<br>• Construction on the transmission backup control center was completed in December 2015. |
| VIII. NESC wind loading standards for transmission and distribution | • NESC wind loading requirements for transmission, substation, and distribution facilities were followed. |
| IX. Consideration for NESC Grade B (or equivalent) standards for distribution | • Freeway and railroad crossings were constructed to B grade requirements pursuant to the NESC.<br>• New overhead freeway crossings were constructed on concrete poles.<br>• Step transformer banks using 250 to 500 KVA transformers were constructed on class H2 poles.<br>• 35 kV regulator banks were built with four pole construction.<br>• Single phase primary tangent construction when built on class 3 poles meets grade B construction. |
| X. Damage/outage prediction model for the transmission and distribution | • The Company has several tools for predicting distribution and transmission system damage and potential flooding in substations. |
| XI. Use of distribution structures owned by other entities | • As part of the Company's pole inspection program, the contractors inspected all foreign poles in the designated areas.<br>• The foreign poles that merit replacement or bracing were handled at the expense of the other entity. |
| XII. Restoration of service to priority loads and targeted hardening of infrastructure used to serve priority loads | • All guidelines in the Company's Emergency Operations Plan regarding restoration priorities after a major outage event, including priority customers, were followed. |

| | |
|---|---|
| XIII. Other storm hardening plans | • Memorial Substation, including the control cubicle, three 50 MVA transformers, and switchyard equipment, was elevated in 2018. Work began in 2018 to elevate the control cubicles at Wharton and Wallisville Substations.<br>• Three transmission system hardening projects were completed in 2018. These included rebuilding a portion of the Franklin-Gable St. 138kV Ckt 21B, a portion of the Franklin-Crocket 138kV Ckt 21M, and a portion of the Downtown-Crocket 138kV Ckt 91E. |